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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,298	09/09/2004	Michael M. Iwatake	FIS920040156	5297
32074	7590	01/30/2006	EXAMINER	
INTERNATIONAL BUSINESS MACHINES CORPORATION DEPT. 18G BLDG. 300-482 2070 ROUTE 52 HOPEWELL JUNCTION, NY 12533			MAI, ANH D	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 01/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

3/11

Office Action Summary	Application No.	Applicant(s)	
	10/711,298	IWATAKE ET AL.	
	Examiner	Art Unit	
	Anh D. Mai	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 11-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9/09/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of invention claims 1-10 in the reply filed on January 6, 2006 is acknowledged.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: A VIA CONTACT STRUCTURE HAVING A SILICIDE LAYER.

Note that, there is only one silicide layer in the invention.

Claim Objections

3. Claim 1 is objected to because of the following informalities:

Line 10 recites: "said second layer including a second metal lining a sidewall of said opening and a silicide of said second metal" however, the correct term should be – said second layer including first metal lining a sidewall of said opening and the silicide of said first metal.

Since the "first metal and second metal" are referring to the same metal 106.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a) Claim 1, line 5 recites: “a dielectric region **overlying** said first layer”.

As shown in Fig. 8, none of the dielectric layers 103, 105 nor 112 overlying the silicide (first) layer 108. At best the dielectric region 112 overlies the substrate or diffusion region 102.

b) Claim 1, lines 9-11 recites: “said second layer including a second metal lining a sidewall of said opening **and a silicide of said second metal** self-aligned to said top surface in said opening”.

Keep in mind that one (bottom) portion of the metal layer 106 is converted into silicide 108 (as claimed “first layer consisting essentially of a silicide of first metal in contact with said diffusion region at said top surface”) and the remaining portions are on the top surface (120) of the dielectric region (112) and sidewall of the opening. (See Fig. 8).

It appears that the Applicant inadvertently create a confusion thus, indefinite.

In light of the disclosure, the claim is determined as follows: the first layer is the silicide portion 108 of layer 106 and the second layer includes sidewall portion and top portion of layer 106.

5. Claims 1-10 are further rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission

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amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: “a first layer” and “a second layer”. There is no nexus between these two layers.

6. Claim 5 is further rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites: wherein said first metal consists essentially of cobalt **and** the second metal consists essentially of titanium.

The claim appears to imply that there are first metal and second metal exist at the same time, which means there are two layers.

However, the first metal and the second metal are the same metal (metal of layer 106).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohsaki et al. (JP. Patent No. 08-107087).

With respect to claim 1, as best understood by the examiner, Ohsaki teaches a via contact to a diffusion region (52) at a top surface of a substrate (51) including a single-crystal semiconductor region including:

a first layer (57) consisting essentially of a silicide of a first metal (55) in contact with the diffusion region (52) at the top surface;

a dielectric region (53) overlying the diffusion region (52), the dielectric region (53) having an outer surface and an opening (54) extending from the outer surface to the top surface of the substrate (51);

a second layer (55) lining the opening (54) and contacting the top surface (52a) in the opening, the second layer (55) including a second metal (55) lining a sidewall of the opening (54) and a silicide (57) of the second metal (55) self-aligned to the top surface (52a) in the opening;

a diffusion barrier layer (56) overlying the second layer (55) within the opening (54);
and

a third layer (58) including a third metal overlying the diffusion barrier layer (56) and filling the opening (54). (See Fig. 14).

With respect to claim 2, as best understood by the examiner, the first metal (55) of Ohsaki is selected from the group consisting of cobalt (Co), molybdenum (Mo), niobium (Nb), nickel (Ni), palladium (Pd), platinum (Pt), tantalum (Ta), titanium (Ti), vanadium (V) and tungsten (W).

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With respect to claim 3, as best understood by the examiner, the second metal (55) of Ohsaki is selected from the group consisting of titanium (Ti), nickel (Ni), platinum (Pt), cobalt (Co), tantalum (Ta), and tungsten (W).

With respect to claim 4, the first metal (55) and the second metal (55) of are the same.

With respect to claim 5, as best understood by the examiner, the first metal (55) and second metal (55) of Ohsaki are the same metal consists essentially of titanium.

With respect to claim 6, the diffusion barrier layer (56) of Ohsaki includes a metal nitride.

With respect to claim 7, the metal nitride (56) of Ohsaki includes titanium nitride (TiN).

With respect to claim 8, the third metal (58) of Ohsaki includes tungsten (W).

With respect to claim 9, the opening (54) of Ohsaki has a width (0.6 μm or less) which includes the claimed range (of about 250 nm or less) and a height-to-width aspect ratio greater than one.

With respect to claim 10, the aspect ratio value of Ohsaki is about 2.5 which encompasses the claimed range.

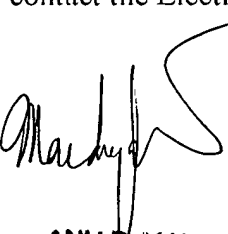
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ANH D. MAI
PRIMARY EXAMINER